# SAC
# graf/pen™

## the most widely used data tablet

**the man/computer interface that brings new speed and accuracy to commerce, industry and science— digitizing formatted and graphical information for direct entry into computers for such applications, among many others, as…**

**order transmission**

**inventory control**

**computer-aided drafting**

**numerical-control programs**

**system analysis**

**light-pen replacement**

## featuring

**hard copy created during input plus high resolution, linearity, stability, precision, flexibility, and reproducibility—at low cost, with no keyboard, mouse or joystick required**

The **graf/pen** Data Tablet brings new and needed facilities to the worlds of business, industry, and technology . . . gives the decision-maker the ability to enter written, drawn, or formatted material directly into a computer. Options include, among many others: display on and interaction with one or more cathode-ray tubes, operation of X-Y recorders and other equipment, recording for de-layed display and analysis, 3-D operation, as well as audio/visual "conversation" with a remote terminal.

Material drawn, written or marked on the Tablet with the Stylus yields a permanent copy and is simultaneously digitized by **hypersonic ranging,** a new encoding principle, at rates up to 200 co-ordinate pairs per second and a resolution of 2000 x 2000 line pairs. The sensing rate is variable to match the user's speed and for efficient use of communications circuits and computer capacity. Output data, at TTL levels, are available in binary or BCD. A wide variety of interfaces can be supplied for various peripherals and computers.

Investment in a SAC **graf/pen** is a fraction of that for similar equipment offering far less precision and versatility. OEM inquires are welcomed.

# description

The **graf/pen** comprises a **Tablet,** a **Stylus,** and a **Control Unit.** For display, a storage CRT or X-Y Recorder may be added.

The **Standard Tablet** has an active area 14 x 14 inches, but any size and shape can be supplied: Frosted (for rear-projection) and transparent plates are available.

**Strip Sensors** on two sides of the Tablet receive signals from the Stylus.
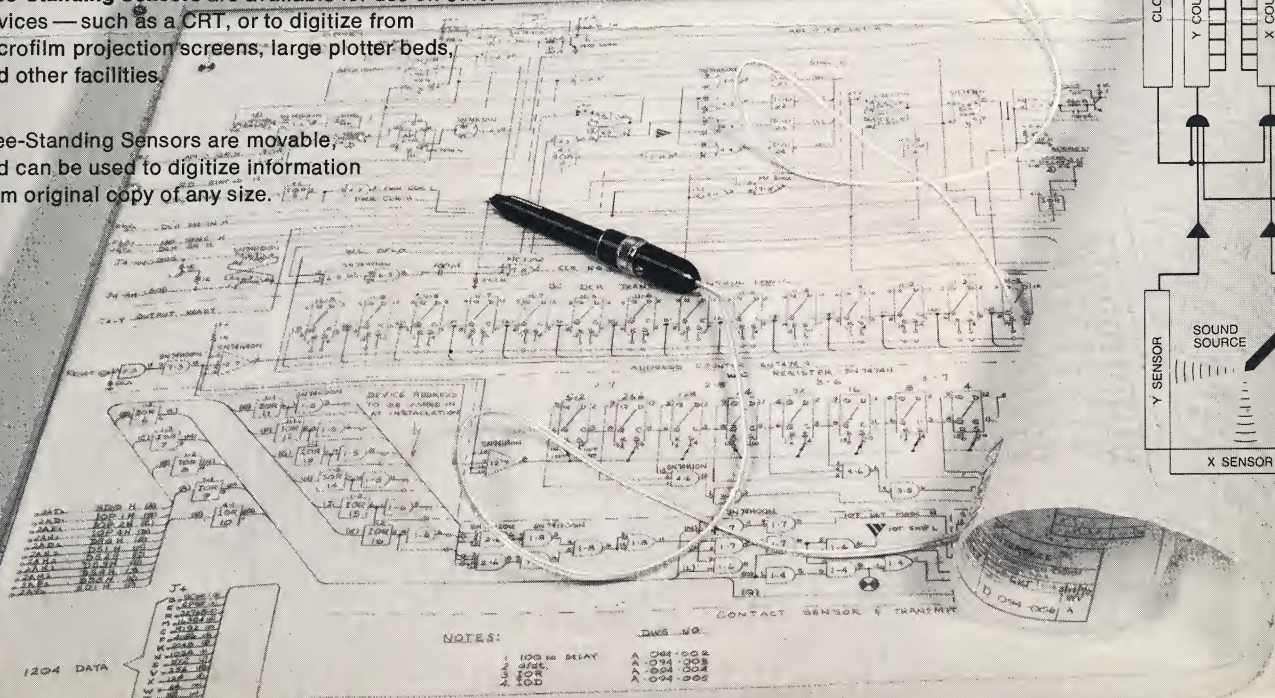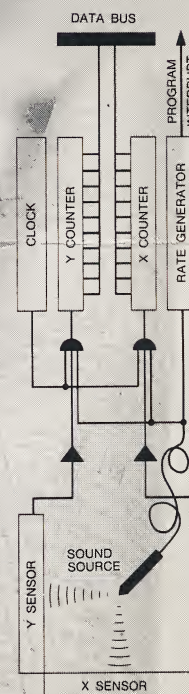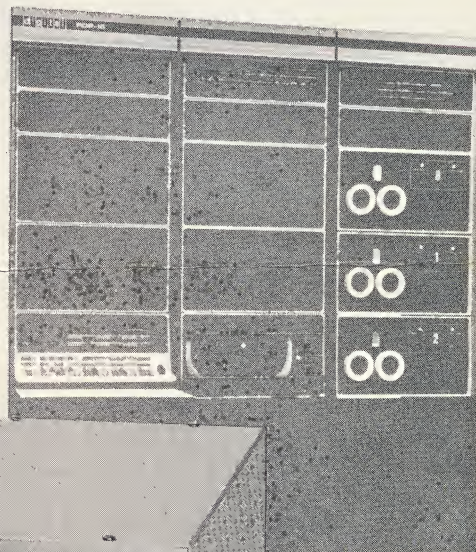
The **Stylus** combines a ball-point pen with a tiny spark gap; the low-energy spark generates the sonic pulse with an extremely fast risetime used in the hypersonic ranging, and a small fraction of the energy provides the operator with a useful audible feedback. The Stylus is used with the Tablet and other Sensor-equipped devices.

The **Control Unit** interprets information from the Sensors indicating the position of the Stylus on the X and Y axes of the Tablet, and discriminates against ambient noise. The data bus uses standard TTL levels. A variety of operating modes is selectable by panel switches.

**Free-Standing Sensors** are available for use on other devices — such as a CRT, or to digitize from microfilm projection screens, large plotter beds, and other facilities.

Free-Standing Sensors are movable, and can be used to digitize information from original copy of any size.

CRT Display ●
Interaction with a CRT ●
Transmission ●
over voice-grade circuits
Storage for delayed ●
analysis and display
Cursor Control by Stylus ●

DATA BUS

CLOCK

Y COUNTER

X COUNTER

RATE GENERATOR

PROGRAM INTERRUPT

Y SENSOR

SOUND SOURCE

X SENSOR

# applications

Applications of the **graf/pen** are as varied as
the user's needs, and new uses are reported
almost daily. Among the more interesting to come
to our attention are:

## ORDERING

with a standard tabular
form, items and quantities
are indicated by a
touch of the Stylus and
digitized — and then, via
computer, may be checked
against inventory,
recorded, and confirmed.

## CAD
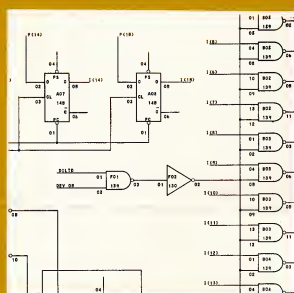
without keyboard, mouse,
light pen or cursor,
rough sketches or menu-
selected symbols are
transferred to paper as
finished engineering
drawings by a **graf/pen**-
controlled computer-aided
drafting system.

## NC PROGRAMS
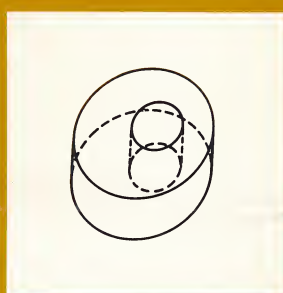
numerical-control
machining instructions are
digitized directly from
the part itself or a shop
drawing, and recorded on
paper or magnetic tape.

## SYSTEM ANALYSIS
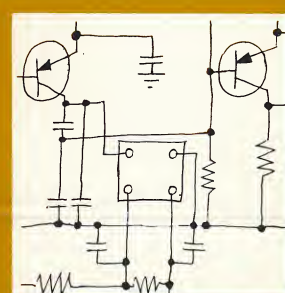
a flow diagram or
electronic circuit can be
sketched on the Tablet
and the component
parameters entered into
the computer; performance
is read out; parameters
or dimensions can be
altered and new values
reported.

## PAGE MAKE-UP

rough printed copy is
combined with instructions
on the Tablet to create
finished page layouts
which can be duplicated
by automated printing
equipment.

## COMMUNICATIONS
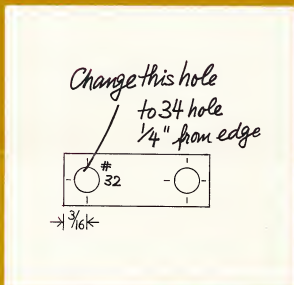
one-way and two-way
audio-visual
"conversations" via
voice-grade circuit and
with graphical interaction
on CRTs or X-Y recorders.

## DATA REDUCTION

digitizing visual records
such as EKGs, EEGs,
Response Curves,
Statistical Graphs, and
Polaroid photos of
transient phenomena, for
computer analysis.

## HPCR

**H**and-**P**rinted **C**haracter
**R**ecognition, the
interpretation of the
dynamics of alpha-numeric
characters while being
formed by the **graf/pen**
Stylus, and conversion to
machine-usable form.

# operation

Paper placed on the writing surface of the Tablet provides a permanent record of written or drawn input. Standard forms may be marked with the Stylus, or images may be projected from behind onto a frosted plate.

The spark is initiated by the Control Unit, by pressure of the Stylus on the Tablet or CRT face, or by command of a computer. Choice of Operating Mode is made by a switch on the Control Unit Panel.

X-Y Counters and Clock Pulses start with the spark. Fast-risetime soundwaves from the spark propagate through the air to the Sensors and cause the counters to stop; the counters then contain binary numbers proportional to the X and Y distances from the Stylus spark to the Sensors. After these numbers are

settled in the Output Register, an "Output-Ready" pulse is generated and the numbers are available for external equipment (CRT, computer, etc.). Coordinate pairs are generated repeatedly at rates as fast as 200 per second. When the Stylus is moved, different binary numbers are entered in the X and Y Counters.

Inherent characteristics of the Sensors and filtering in the Control Unit limit the sensitivity of the sonic system to the wavefront generated by the spark, and prevent interference by even the highest ambient-noise level found in computer rooms.

Tablets are easily re-oriented for left-handed operators.

The Controls described under SPECIFICATIONS allow for operation in the following modes:

**Rep Rate** is continuously-variable from one to 200 coordinate pairs per second.

**Pen Mode** allows continuous digitizing when the Stylus pen is in actual contact with the surface of the Tablet or a paper placed thereon, or the face of a CRT or other sensor-equipped device.

**Free-Run Mode** has the internal Rep-Rate Control in command, and digitizing continues **even with the Stylus several inches above the surface of the Tablet!**

**Single-Shot Mode** creates one coordinate pair for each Stylus-tip contact with the Tablet or CRT face.

**Remote Mode** allows a computer to call for new coordinate pairs.

# general specifications

RESOLUTION .......................... 2000 X 2000 Line Pairs (0.007" for 14" Tablet)

DATA RATE ........................... Variable, one to 200 Word Pairs per second

REPRODUCIBILITY ..................... One Least-Significant Bit in 11; or, in BCD version, one count out of 2000.

**DIGITAL OUTPUTS**

Registers ............................ X and Y 11-Bit Binary or 4-Digit BCD, with standard TTL Buffers (also Line Drivers and Open Collector Buffers available)
Output Ready ......................... Ground-going Pulse
Pen Control .......................... Ground, when Stylus is in contact with Tablet or CRT

**CONTROLS** (on Front Panel)

Power ............................... On/Off
Rate ................................ Coordinate-Pair Rate selectable from 0 to 200 pairs per second
Modes ............................... Free-Run, Single-Shot, Pen-Control, Remote
Dimmer .............................. Continuously-variable, adjusting display brightness for comfort in dim environment
Left Hand/Right Hand ................ Interchanges X and Y axes for more convenient use by left-handed operators
Reset ............................... Clears Registers

**INDICATORS** (on Front Panel)

X and Y Displays (optional) ......... Two groups of 11 light-emitting diodes or, in BCD version, four digits of 7-segment LEDs
Power ............................... On

**CONNECTORS**

Front Panel ......................... For Stylus and Sensor Cables
Back Panel .......................... Output Connector for X Data and Y Data; X and Y Register Overflows; Output-Ready (program interrupt); Pen Control (Z axis); External Reset

TABLET (standard) ................... Useful area 14" x 14" (other sizes available); clear or frosted plates available.

specifications subject to improvement without notice

**Please send me information on the GRAF/PEN as it applies to:**

- ☐ Business Data Entry
- ☐ Printed Page Make-Up
- ☐ Mapping
- ☐ Medical Data
- ☐ Data Reduction
- ☐ Census Analysis
- ☐ Other

- ☐ Interactive Graphics
- ☐ High Energy Physics
- ☐ Light Pen Replacement
- ☐ CRT Photo Digitization
- ☐ Speech Synthesis
- ☐ Architectural Design
- ☐ Quality Control

☐ I would like a demonstration.
☐ Have a Sales Engineer contact me.
☐ Add me to your mailing list.

My interest is: ☐ for an active project ☐ general interest
☐ updating my files

NAME _____ TITLE _____

COMPANY _____ DEPT. _____

STREET _____ CITY _____ STATE _____ ZIP _____

COUNTRY _____ PHONE (Area Code) _____ EXT _____

Dear Sir:

We appreciate your interest in the Graf/Pen as a means to solve your input problems.  Additional information is enclosed with this letter so that you can determine more directly how the Graf/Pen applies to your needs.

Our local representative, identified below, will be happy to answer your questions or arrange for a demonstration.

SAC offers Graf/Pen interfaces for off-line devices (tape punch, incremental magnetic tape drive, card punch, Teletype, storage-type CRT, X-Y recorder) and for hard-wire to computers.  For keyboard or menu selection, either alone or combined with graphics, Graf/Pen accessories can generate digital codes to reproduce your alphanumerics, symbols and instructions. Please send us details on your system requirements.

We would be pleased to submit a quotation on larger quantities of the Graf/Pen, and on simplified packaging of components for inclusion in your system.  There is a considerable price reduction for continuing contracts and simplified component specifications.  We invite you to submit a description of your requirements and probable quantities.

More detailed information is available on current Graf/Pen applications. Please fill in the enclosed reply card so that we can continue to serve your needs.

Sincerely,

Rolf Kates
Director of Marketing

RK/ljw

Enc. GP-2 Brochure
     Reply Card

cc: Inquiry File
    Reader's
    LHH
    Rep

Your sales representative is:

MR. GEORGE SCHWAMB
COMPONENT SALES CORPORATION
221 EAST HARTSDALE AVENUE
HARTSDALE, NEW YORK 10530